



HYPER 81

MAINTENANCE, OPERATING
AND SERVICE MANUAL

SD8

 **MADE IN
BRITAIN**



Certificate No. 2448/00

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1. INTRODUCTION

The BULROC range of Hyper down the hole hammers are strong and robust tools of a simple and straight forward design to provide maximum performance, with a minimum of maintenance.

Please Note:

That, contrary to other BULROC hammer models, the Hyper series **do use** bits with Footvalves.

BULROC Hyper hammers are supplied as standard with a Check Valve arrangement which is designed to maintain the pressure inside the hammer when the air is switched off and so help prevent contaminated water from entering the hammer.

BULROC Hyper hammers are designed to give optimum performance with the minimum consumption of compressed air. If, however, particular deep-hole application require extra air flushing. This can be achieved by drilling through the soft alloy plug in the piston.

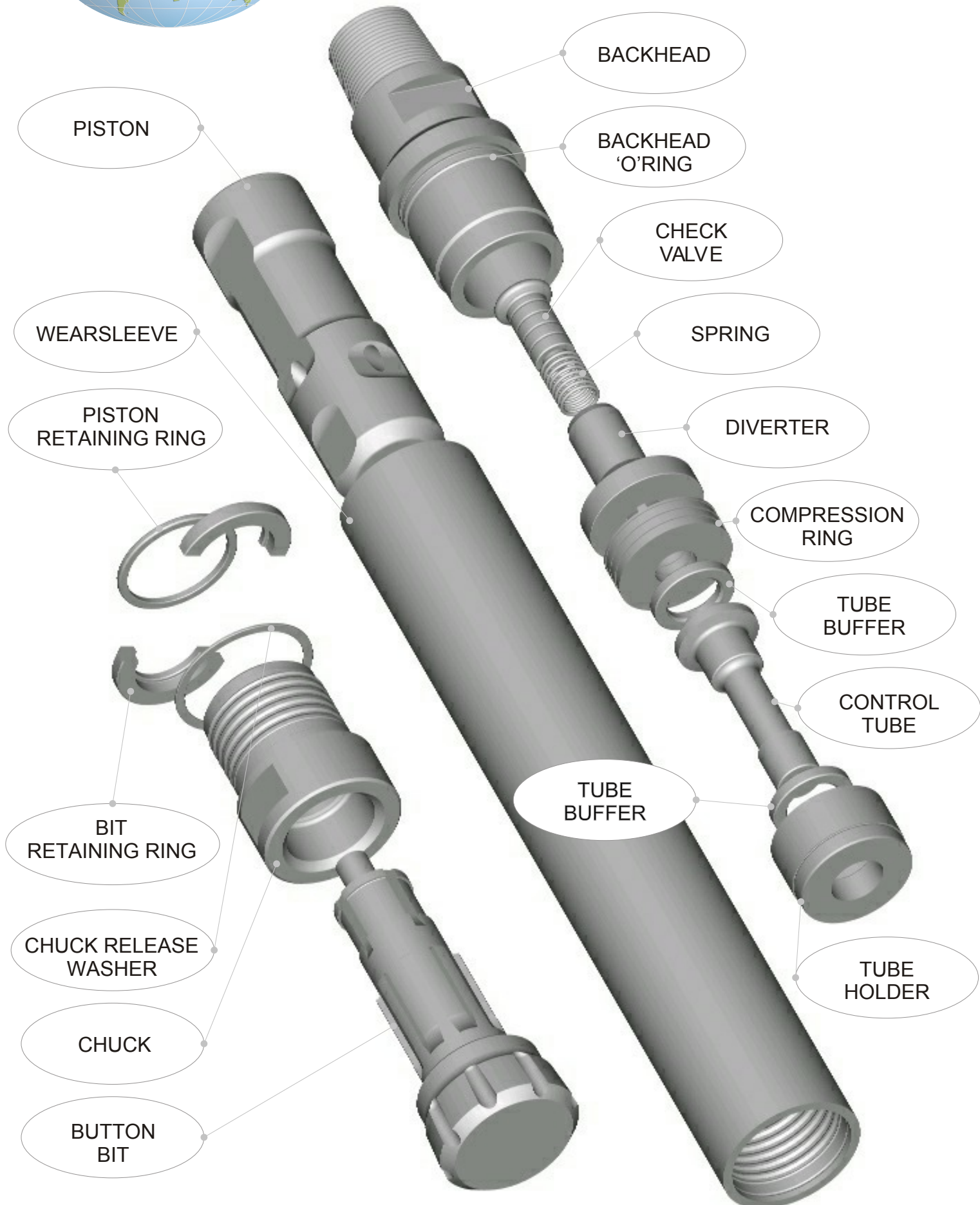


WARNING

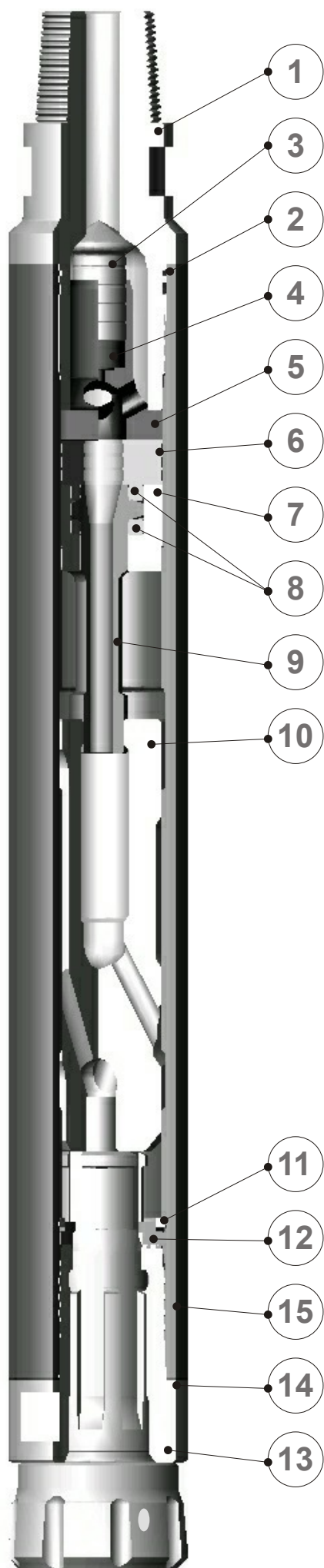
ALWAYS THINK SAFETY FIRST!

HYPER 81 SD8 Conversion

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3. HYPER HAMMER 81 COMPONENTS

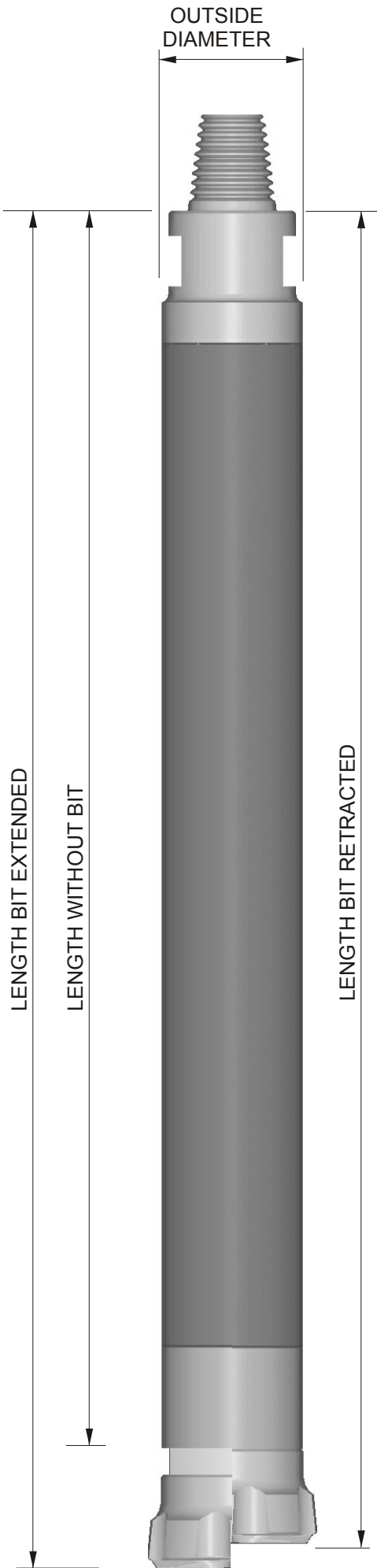


Ref	Description	Part Number
1	Backhead	HSH813804M
2	Backhead 'O' Ring	IPBOR01
3	Check Valve	IPRCV05
4	Check Valve Spring	IPRCVS04
5	Diverter	HSH8120
6	Compression Ring	HSH8128
7	Tube Holder	HSH8131
8	Tube Buffer (2)	HSH8129
9	Control Tube	HSH8130
10	Piston	HSH8103045
11	Piston Retaining Ring	HSH8132
12	Bit Retainer Ring	HSH8137045
13	Chuck	HSH6135045
14	Chuck Release Washer	HSH8126
15	Wearsleeve	HSH8100
Complete Hammer		BR81H03



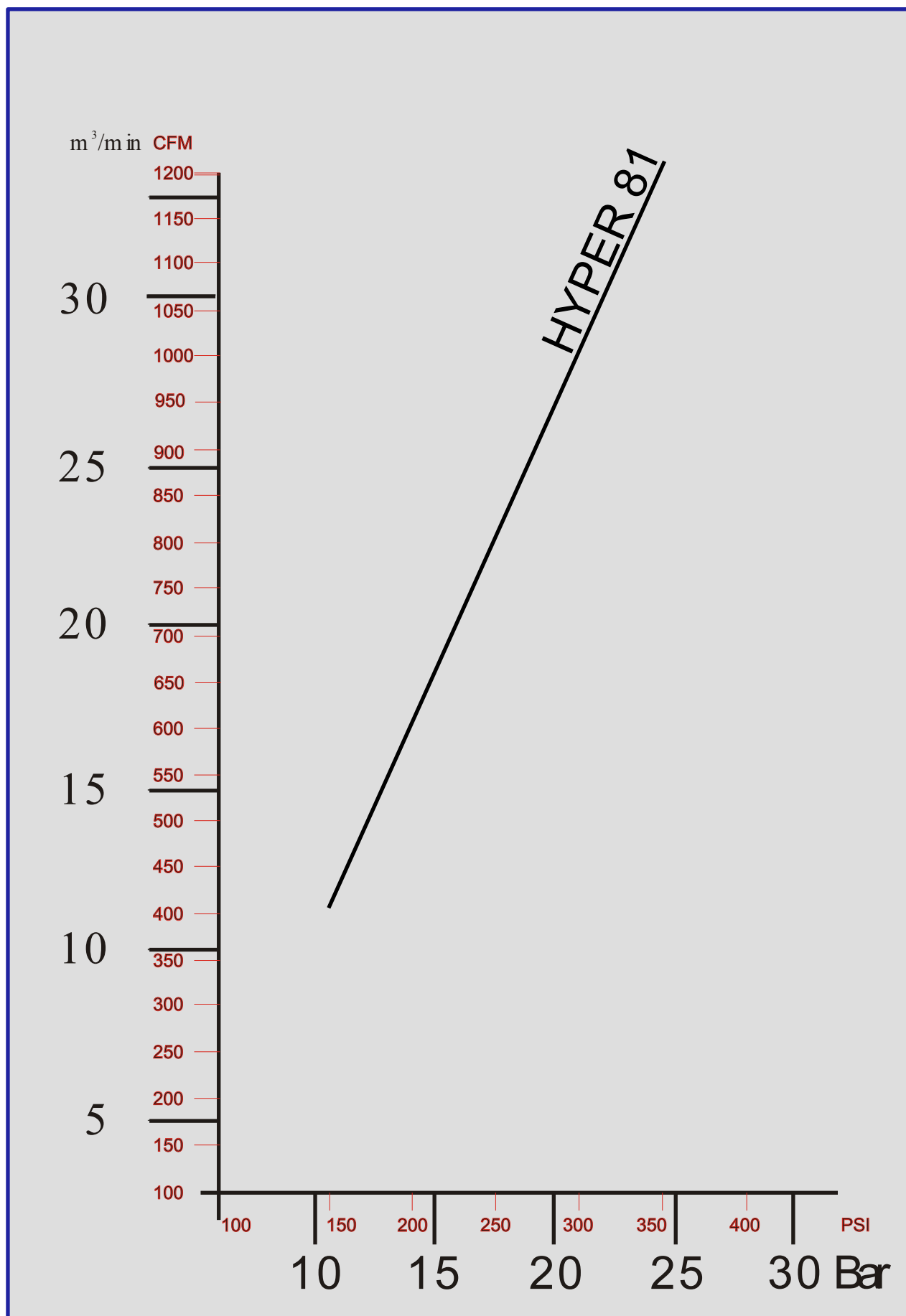
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4. HYPER 81 HAMMER SPECIFICATIONS



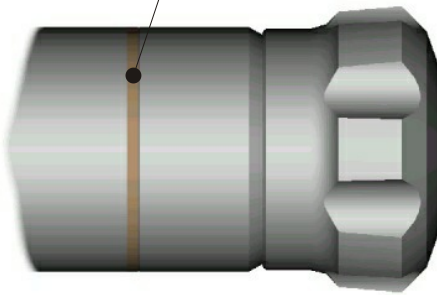
	HYPER 81
STANDARD BACKHEAD CONNECTIONS	4 1/2"API REG PIN
CHUCK CONNECTION	SD8
LENGTH (WITHOUT BIT)	54.5" 1380mm
LENGTH (BIT EXTENDED)	60.875" 1550mm
LENGTH (BIT RETRACTED)	58.625" 1490mm
OUTSIDE DIAMETER OF HAMMER	7.25" 184.1mm
BORE DIAMETER	5.88" 149.4mm
PISTON STROKE	4.00" 102mm
PISTON WEIGHT	113.3 lb 51.4 kg
COMPLETE HAMMER WEIGHT WITHOUT BIT	426.8 lb 194.0 kg

5. AIR CONSUMPTION

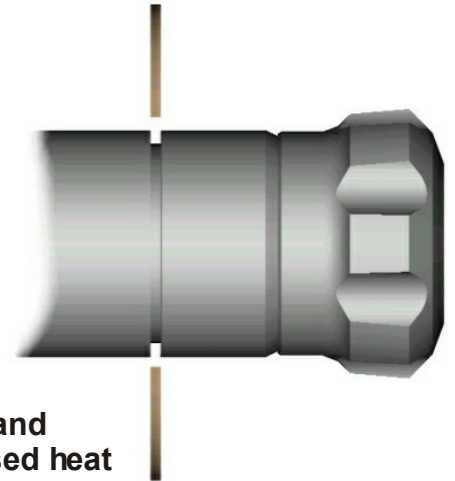


6. STRIPPING THE HYPER 81 HAMMER

Breakout Washer



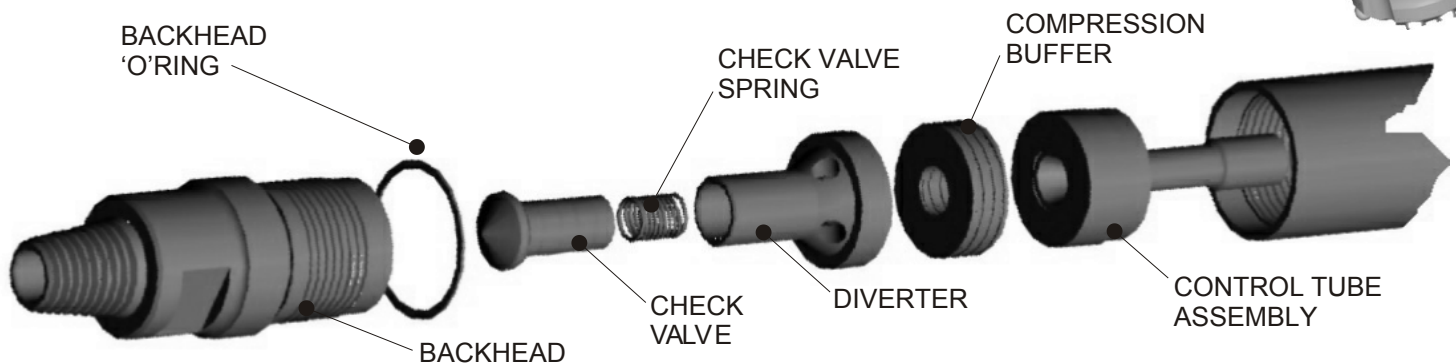
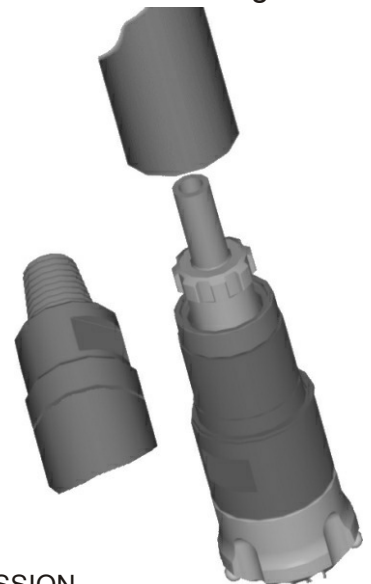
After extensive drilling the chuck might become too tight to loosen on a Bulroc Bench Splitter or the drill rig. If this problem occurs the breakout washer can be ground or drilled out, which will relieve the pressure and enable the chuck to be removed.



(NB On no account should the wearsleeve be impacted by a hand hammer. Splitting should not be assisted by the use of localised heat i.e. Blow torch.)

Assuming now both the Chuck and Backhead threads have been loosened either on the drilling rig, or a hammer splitter. The stripping procedure is as follows.

1. First remove the Chuck assembly. This comprises the Button Bit, Chuck, Chuck Release Washer and the Bit Retainers.
2. With the hammer laid horizontal, unscrew the Backhead and remove it from the Wearsleeve. The Diverter along with the Check Valve arrangement can now be pulled from the Backhead end.
3. The remaining Compression Buffer and Control Tube assembly can best be removed by lifting the Chuck end of the Wearsleeve which will allow the Piston to push the parts up to the end face, from where they can be removed by hand.



4. Lifting the Chuck end of the Wearsleeve again will allow the Piston to slide to the end face from where it can be removed by hand.

5. Unless there is damage to the Piston Retaining Ring it should not be necessary to remove it from the Wearsleeve. However if the Retainer is damaged it can be removed by dropping the inverted Piston onto the ring from the Backhead end of the Wearsleeve.



7. CHECKING FOR WEAR AND DAMAGE

PISTON

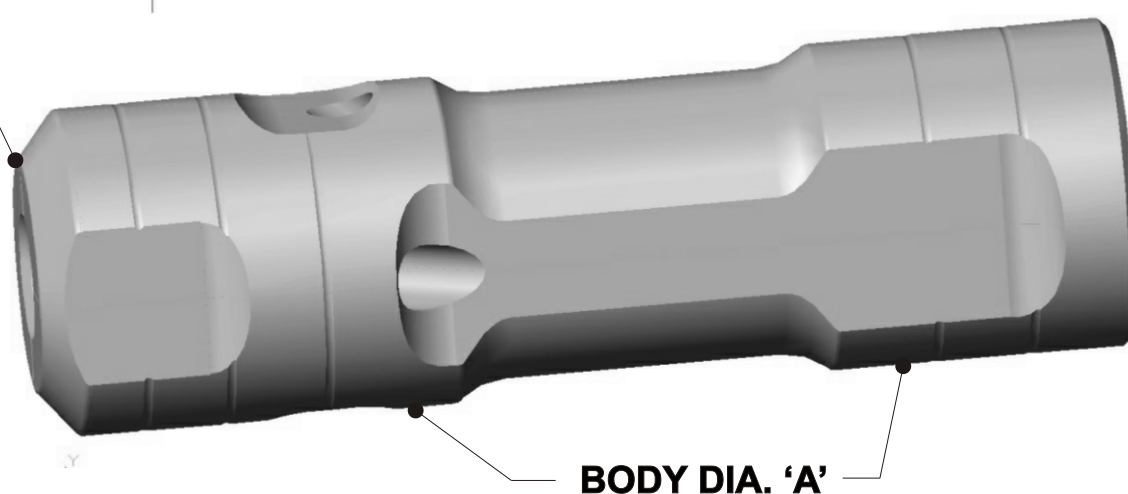
Premature wear to internal parts is a result of either:

1. Incorrect or insufficient lubrication.
2. The ingress of debris into the hammer.
3. Incorrect service and storage.



The maximum wear allowances shown in this section are a guide as to when to replace parts. In certain conditions parts may need to be replaced before they reach the sizes shown.

STRIKING FACE



1. There are two main areas to examine on a used Piston. Check the Body diameter 'A' for signs of 'Pick-up' and burning (both are signs of poor lubrication.) Using a micrometer, measure the diameter and refer to the table below for the minimum size.

Any light 'Pick-up' marks can be removed by using emery cloth, however if there are signs of overheating and cracking, the Piston should be replaced and the lubrication system examined.

2. Secondly, using a micrometer, measure the diameter of the bore at both ends of the piston and refer to the maximum quoted sizes.

3. Examine the striking face. Distortion is acceptable providing there are no signs of cracking. Burrs and dents can be removed with an emery stone.

HAMMER	MINIMUM Ø (A)
HYPER 81	5.870" (149.10mm)

7. CHECKING FOR WEAR AND DAMAGE

MAINTAINING THE PISTON

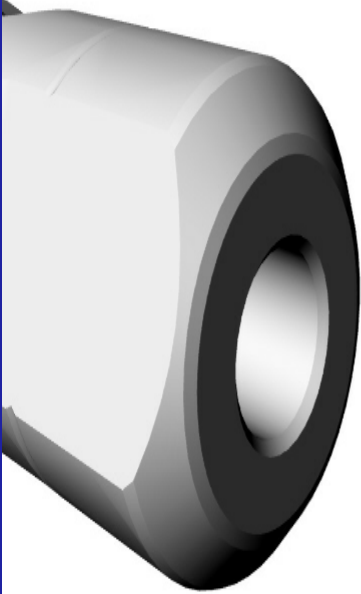


Fig.1 New Piston Face

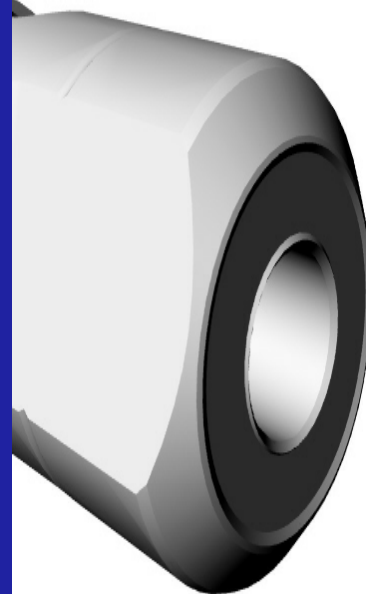


Fig. 2 Worn Piston Face

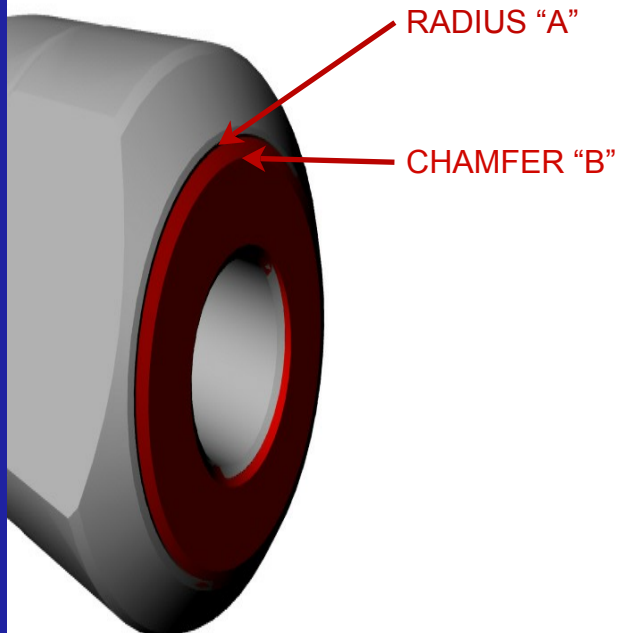


Fig. 3 Area to be machined

During the working life of the hammer the Striking Face on the Piston may become dented or deformed (see *fig.2*). To prevent this face from cracking, or chipping, the Piston should be returned to a lathe where the striking face can be re-machined flat and then have the outer radius and inner chamfer reformed (see *fig.3*)..

Care should be taken to remove the minimum amount of material during this re-machining process and at no point should more than 2mm be removed from the face. **Pistons with wear patterns, or indentations deeper than 2mm should be replaced.**

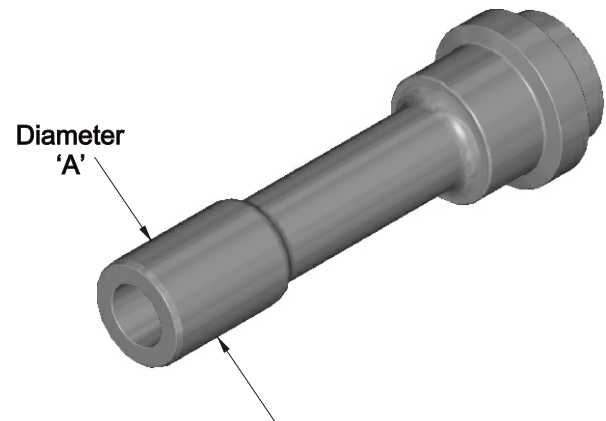
The table below contains useful machine information for reforming the piston face.

MACHINE DETAIL		
HAMMER	RADIUS "A"	CHAMFER "B"
HYPER 81	0.125"	0.150" @45

8. CHECKING FOR WEAR AND DAMAGE

CONTROL TUBE

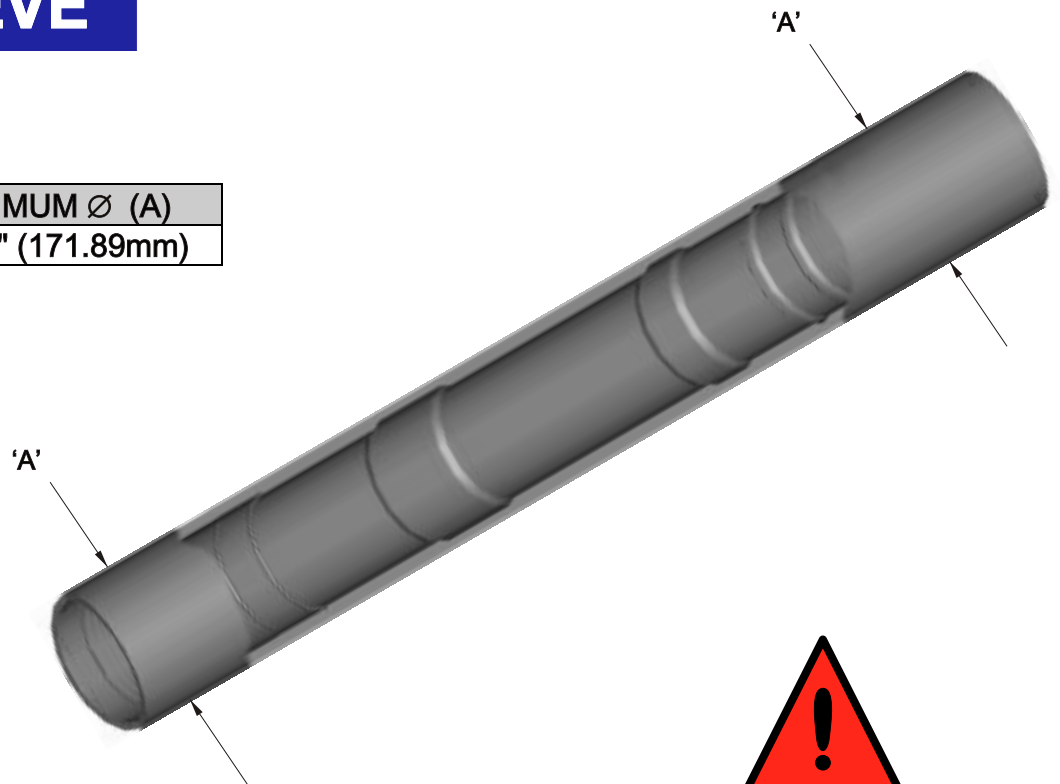
HAMMER	MINIMUM Ø (A)
HYPER 81	2.368" (60.15mm)



Examine the Control Tube Dia. 'A', using a micrometer, check the diameter has not worn under the specified minimum. If there are signs of 'Pick-up' they should be removed by using emery cloth.

WEARSLEEVE

HAMMER	MINIMUM Ø (A)
HYPER 81	6.76" (171.89mm)

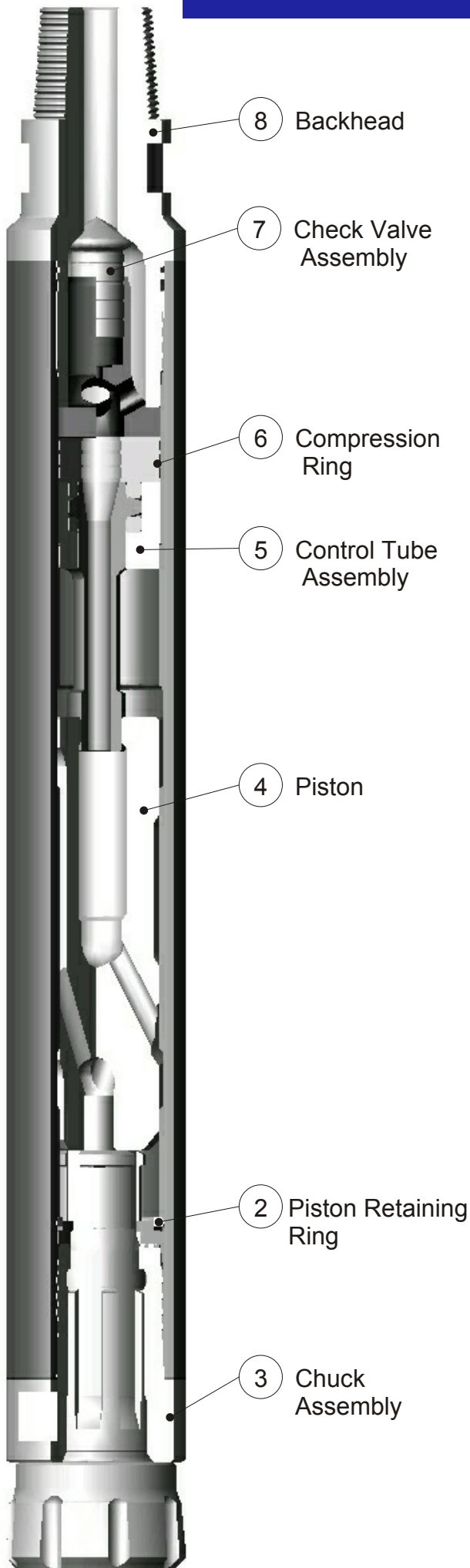


Using either a micrometer or a vernier, measure the outer diameter 'A' of the Wearsleeve. If it is below the minimum it must be replaced. The wear rate of the Wearsleeve can be slowed by replacing the Chuck before the wear area reaches the Wearsleeve.

The bore of the Wearsleeve should be periodically checked for any signs of 'Pick-up'.

If a Piston has broken within the Wearsleeve it is imperative that the bore is honed to remove any Burrs or 'Pick-up'. Failure to do so will result in 'Pick-up' on the replaced Piston and will lead to early failure of this component.

9. REBUILDING THE HYPER 81



1. Ensure all the maintenance work outlined in the previous section has been completed.

2. Stand the Wearsleeve on the floor, Chuck end upwards. Insert the Piston Retaining Ring into the bore, hammer the ring down until it springs into the groove in the Wearsleeve bore. It is important to make sure that the Piston Retaining Ring is positioned in the groove correctly. Failure to do so will seriously effect hammer performance.

3. Clamp the Wearsleeve horizontally in a vice taking care not to overtighten the jaws. Assemble the Chuck, Chuck Release Washer and Bit Retainers around the Bit ensuring the Retainers are fitted with a new 'O'Ring. Grease the bit retainers well to ensure they don't slip. Cover the threads with a copper based grease. Then lift the whole assembly into the Wearsleeve. Screw the Chuck fully in until there is no gap between the Wearsleeve and the Chuck Release Washer.

4. Coat the Piston with rock drill oil and slide it into the Backhead end of the Wearsleeve. (ensure the Piston striking face enters first.)

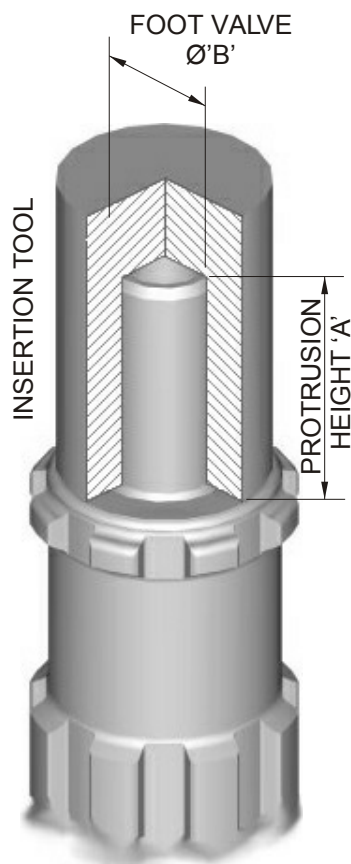
5. Assemble the two Control Tube Buffers around the Control Tube and then push the assembly into the Tube Holder. Coat the outside of the assembly with rock drill oil and insert it into the Backhead end of the Wearsleeve.

6. Slide the Compression Ring on to the Control Tube Assembly

7. Insert the Spring into the Check Valve, and then slide the assembly into the Valve Chest. Push the whole assembly down onto the Compression Ring.

8. Fit a new 'O'Ring to the Backhead and coat the threads with a copper based thread grease. Screw the Backhead into the Wearsleeve until it is hand tight, then measure the gap between the Wearsleeve face and the lock-up face on the Backhead. This gap should be a minimum of 1 mm, if the gap is smaller, the ring should be removed and replaced with a new Compression Ring. When the gap exceeds 1mm the Backhead should be fully tightened using the appropriate Backhead spanner.

10. BUTTON BIT FOOT VALVES



Bulroc Hyper hammers are designed to be used with Foot Valves that are to the following specifications:

	INSERTION TOOL No,	PROTRUSION HEIGHT "A"	FOOTVALVE DIAMETER "B"	SHANK TYPE
HYPER 81	FVIT045	1.890" (48mm)	1.690" (mm)	SD8

To guarantee the diameter and protrusion height are correct it is recommended the correct insertion tool is used.

Using Foot Valves which are larger in diameter than the sizes shown, will result in premature failure of the Foot Valve.

Foot Valves which are much smaller in diameter than the sizes shown will reduce the performance of the hammer.



11. LUBRICATION

Inadequate supply of the correct type of oil is a major contributor to excessive component wear and consequently, a rapid fall off in performance. An air line lubrication should be installed, preferably on the drill rig. This should be of sufficient capacity to supply the required volume of oil for a full shift. The lubrication must be adjustable and set to ensure the correct flow of oil required by the hammer. The amount of lubricating oil will vary with the operating pressure and volume of air used by the hammer. As a general guide, any Bulroc Hyper hammer will require 1/3 rd of a pint per 100 CFM through the hammer (0.07 ltr per 1.0 M³/min per hour).

e.g. Hyper 81 operating at 250 psi = 800 cfm = 2.6 pints per hour
Bar = 22.7 M³/min = 1.6 ltr per hour

When drilling with foam or water, the amount of lubricating oil should be increased by 50%. When new drill tubes are put into use, it is recommended that 1/2 a pint of oil (0.25 ltrs) be poured into each new tube to give them a good coating of oil and to prevent the hammer from running dry at any time. Ambient temperatures will determine the grade of Rock Drill oil to be used. Should the ambient temperature be between 0°C and 25°C, use a 30 grade oil. When the ambient temperature is over 25°C, use a 50 grade oil. A selection of recommended Rock Drill oils suitable for Bulroc Hyper hammers is given below.

MAKE	TYPE 30 GRADE	TYPE 50 GRADE
BULROC	T220	T320
BP	ENERGOL RD-E 100	ENERGOL RD-E 300
CHEVRON	ARIES 100	ARIES 320
SHELL	TORCULA 100	TORCULA 320
ESSO/EXXON	AROX EP100	AROX EP320



12. HYPER 81 STORAGE PROCEDURE

We recommend following the points listed below when removing a 'Down hole hammer' from service. This will ensure trouble free operation once the hammer starts work again.

The hammer should be stripped and cleaned and free of all water/moisture as possible. Bulroc 320 or similar rock drill oil should be poured into backhead (see chart below for quantity) allowing all parts to be coated throughout the hammer. Both ends of the hammer should be then covered to prevent the ingress of dirt, etc. It should be then laid horizontally in a dry environment ready for use next time.

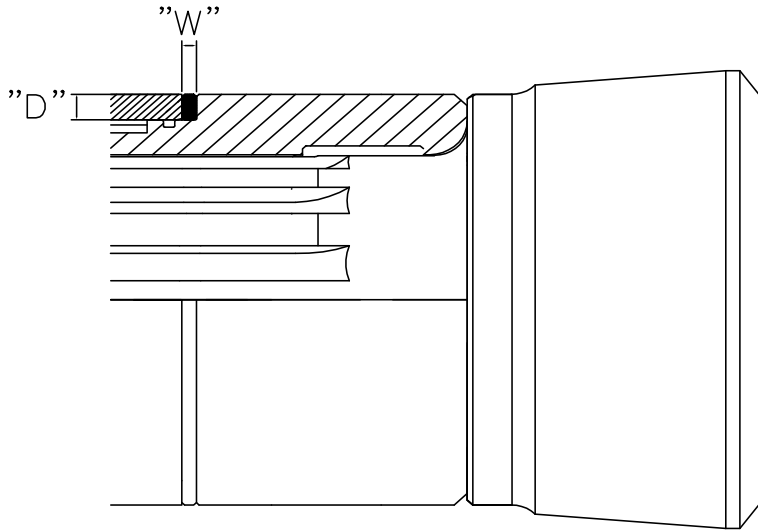
Model	Qty in UK Pints	Qty in liter's
Hyper 81	$\frac{3}{4}$	0.43

If this procedure is followed then apart from protecting the hammer from corrosion it will protect the parts from premature wear and of course reduce 'down time' and eventual repair costs. However we strongly recommend that the hammer, especially if stored for any long periods of time should be stripped, cleaned, inspected and re-oiled prior use to be sure of smooth drilling.

13. TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
INOPERATIVE DRILL	Drill bit blowholes blocked	Unblock holes
	Dirt inside drill	Strip and clean drill
	Worn or damaged parts	Replace damaged parts
	Insufficient lubrication	Check oil level, adjust lube needle value
	Excessive lubrication	Adjust lube needle value
	Hanging Piston	Piston stuck. Polish out the score marks
	Insufficient air pressure	Check compressor discharge and increase to operational value
SLOW PENETRATION	Insufficient air pressure	Increase discharge pressure
	Dull drill bit	Re-grind or change bit
	Worn drill parts	Replace worn parts
	Too much or too little lubrication	Check oil level and if necessary adjust lube needle value
	Dirt in drill	Strip and clean
LOW RETURN AIR VELOCITY	Insufficient hole flushing air passing through hammer	Drill or increase hole size through the piston
	Drill bit exhaust holes blocked	Clean out blockage
SPASMODIC OPERATION	Failed or damaged parts	Overhaul drill
	Lack of oil	Check lubrication
	Drill bit broken	Replace bit
	Dirt in drill	Strip and clean

A. CHUCK RELEASE WASHERS



CHUCK RELEASE WASHERS		
HAMMER MODEL	"W"	"D"
HYPER 81	0.150" - 3.81mm	0.485" - 12.32mm

Chuck Release Washers are fitted to the Bulroc Range of Hyper Hammers to assist the removal of the Chuck from the Wearsleeve after drilling.

The Chuck Release Washer is manufactured from a composite material that reduces the friction between the lock up faces on the Chuck and Wearsleeve making it easier to overcome the tensional loading applied to these parts during the drilling process.

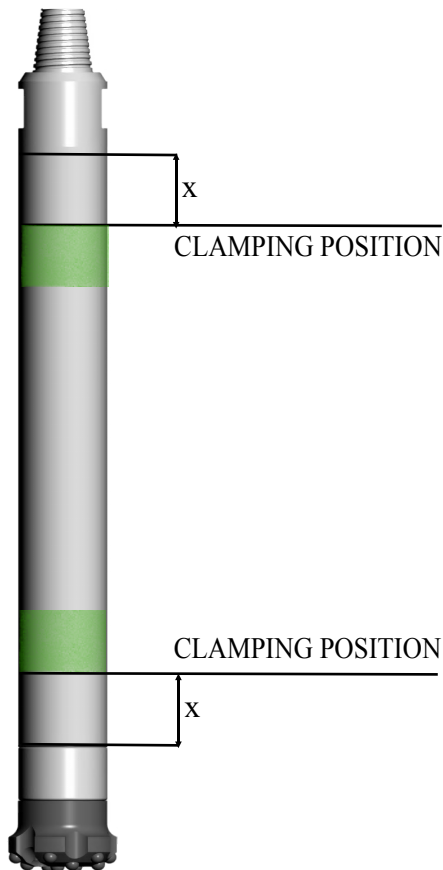
Due to the forces applied to the Chuck Release Washer you may find that its thickness ("W") is reduced during the drilling cycle and it is therefore recommended that a new Washer be fitted each time the Chuck is removed.

It is possible that on some of the larger Hammers in the Bulroc range, when drilling with large diameter Button Bits or Overburden Systems, certain conditions can generate higher torques than normally expected, resulting in difficulties when trying to remove the Chuck from the Wearsleeve. Should this occur then the removal of the Chuck can be achieved by cutting away the Chuck Release Washer. We do however stress at this point that cutting away the Chuck Release Washer is a final option and should not be done until all other options have proved unsuccessful.

If the cutting away of the Chuck Release Washer is necessary for the removal of the Chuck then it must be done with extreme care to avoid damage to either the Chuck or the Wearsleeve. The composition of the Chuck Release Washer allows for it to be cut with either a hacksaw or a small hand grinder equipped with a slitting wheel. The hacksaw method is much safer and less likely to damage the Chuck or Wearsleeve, but obviously much slower than the hand grinder with a slitting wheel. To remove the Chuck Release Washer a cut must be made in the centre of the washer all the way around its circumference, and completely through the Washer, thus transforming the single washer into two thinner washers that will then spin freely. Great care must be taken, especially if the Washer is cut with a slitting wheel, to ensure that the cut only penetrates the Washer and does not pass through into the body of the Chuck.

The size shown as 'D' in the above table should be your MAXIMUM depth of cut, and it is recommended that either the saw blade or the slitting wheel are marked in some way so as to indicate when they have achieved this depth.

B. CLAMPING POSITIONS



CLAMP POSITIONS	
HAMMER MODEL	"X" DISTANCE FROM WEARSLEEVE END FACE
Hyper 81	7.000" / 178mm

There are many different "Splitting" Machines available for unscrewing the threaded connections on a Bulroc Hyper Hammer, some are attachments to the Drill Rig, others are independent hydraulic units, or purpose made Bench arrangements. Regardless of which machine is chosen they all require some method of securing the Wearsleeve whilst applying a torque to either the Chuck or Backhead.

The most common machines use either Clamps or Chains around the O/D of the Wearsleeve and the positioning of these is very important, if they are placed too close to the joint being "Split" they will in effect increase the frictional forces on the threaded connection making it impossible to unscrew the component from the Wearsleeve.

The above table shows the correct position for the clamping mechanism to ensure no additional load will be applied to the threaded connection, thus making the joint easier to split.

Due to the high torque loads applied to a Hammer during its drilling cycle, equally high loads are required to "Split" the Chuck and Backhead away from the Wearsleeve and because of this the clamping arrangement around the Wearsleeve must generate enough friction to prevent it from spinning during the process. However great care must be taken to make sure the clamps or chains are not over-tightened as this can cause deformation to the Wearsleeve that can result in both Wearsleeve failure and Piston seizure once the Hammer is returned to service.

To help increase the Wearsleeve's resistance to deformation it is recommended that the Hammer Piston is first slid to the end of the Hammer being "split", before clamps or chains are attached. By doing this the Piston O/D will limit the amount of deformation in the Wearsleeve bore if too much clamping pressure is applied.

NOTE:

The use of Chain type Hydraulic Breakers can leave deep intrusions in the O/D of the Wearsleeve which may result in stress concentrations that could lead to premature failure of the Wearsleeve.



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